

REMARKS

Claims 8-9, 12-13, 21, 23 and 47-72 were pending in this application. Claims 8-9, 12-13, 21, 55, 56, 59 and 62-64 have been amended and new claims 73-79 have been added hereby. Accordingly, claims 8-9, 12-13, 21, 23 and 47-79 are now pending in this application and are believed to be in condition for allowance for the reasons stated below.

Preliminarily, Applicants note that the Office Action summary page indicates that claims 8-15, 21-23 and 47-72 were pending in this application. However, claims 10, 11, 14, 15 and 22 were previously canceled. Accordingly, and as noted above, claims 8-9, 12-13, 21, 23 and 47-72 along with new claims 73-79 are now pending in this application.

Claims 8, 9, 12, 13, 21, 23, 55-57, 59, 60, 62-66, 71 and 72 were rejected under 35 USC §102(e) over Zhang et al. '291. This ground of rejection is respectfully traversed for the following reasons.

The present invention is related to an apparatus for irradiating laser light with a rectangular shape cross section to a semiconductor in an oxidizing or a nitriding atmosphere in a chamber.

It is respectfully submitted that Zhang et al. fails to teach or suggest a lens having a convex surface and a plane surface as shown in Fig. 1, element 13, Fig. 2, element 33 and Fig. 3, element 60 of the present application and as now recited in the amended claims. Specifically, in accordance with the present invention, the lens is located out of a chamber for irradiating laser light and the lens focuses laser light. The laser light is generated from a laser light generating means and the laser light passes through the lens from a convex surface to the plane surface. Therefore, the convex surface looks toward an incident side of the laser light to the lens while the plane surface looks toward an

irradiation side of the laser light to a semiconductor put into the chamber for irradiating laser light.

Zhang et al. also fails to teach or to suggest a chamber for irradiating laser light to a semiconductor with the intention of forming a silicon oxide layer or a silicon nitride layer on the surface of the semiconductor layer in an oxidizing gas or in a nitriding gas. A silicon oxide layer or a silicon nitride layer prevents a TFT from exhibiting leakage current.

Zhang et al. teaches that the exposure of the surface of a semiconductor film to air causes bonding (“neutralization”) of dangling bonds with oxygen, etc., to form an oxide film and the like on the surface of a semiconductor film, so that it is very important to irradiate the laser light in a vacuum or in an inactive gas atmosphere. See col. 3, lines 25-31 of Zhang et al. In other words, in accordance with Zhang et al., it is not desirable to form an oxide film on the surface of the semiconductor film.

In contrast, in the present invention and as recited in the amended claims, there is provided an apparatus comprising a chamber for irradiating laser light to a semiconductor while exposing the semiconductor in an oxidizing atmosphere such as O₂, N₂O and NO₂ or a nitriding atmosphere such as ammonia. If the semiconductor is exposed to air in accordance with the teachings of Zhang et al., undesired compounds which are not silicon oxide or silicon nitride may be formed on a semiconductor since air includes moisture, etc., in addition to O₂ and N₂.

For at least the foregoing reasons, and in view of the amendments made to the pending claims, Applicants respectfully request that the §102(e) rejection be reconsidered and withdrawn.

Page 3 of the Office Action rejected claims 47-54 under 35 USC §103(a) over Zhang et al. ‘291. This ground of rejection is respectfully traversed.

While Zhang et al. might teach that the cross section of a laser beam has a rectangular shape, Zhang et al. fails to teach or to suggest the features stated above, namely, a lens having a convex surface and a plane surface. Moreover, Zhang et al. fails to teach or to suggest an apparatus comprising a chamber for irradiating laser light to a semiconductor with the intention of forming a silicon oxide layer or a silicon nitride layer on the surface thereof.

For at least these reasons, Applicants respectfully request that the §103(a) rejection of claims 47-54 be reconsidered and withdrawn.

On page 4 of the Office Action, claims 58 and 61 were rejected under 35 USC §103(a) over Zhang et al. '291 and Begin '410. This ground of rejection is respectfully traversed for the following reasons.

Although Begin et al. teaches a loading chamber and a robot assembly, the reference fails to teach or to suggest a chemical vapor deposition chamber, a chamber for irradiating laser light and a laser light generating means. Further, Zhang et al. fails to teach or to suggest a chamber for irradiating a laser light to a semiconductor with the intention of forming a silicon oxide layer or a silicon nitride layer on the surface of a semiconductor and fails also to teach a lens having a convex surface and a plane surface, as recited in the amended claims now pending in this application. Accordingly, even if Zhang et al. and Begin et al. were combined as asserted, the invention as recited in claims 58 and 61 would not result.

In view of the above, Applicants respectfully request that the §103(a) rejection of claims 58 and 61 be reconsidered and withdrawn.

Page 4 of the Office Action also rejected claims 67-70 under 35 USC §103(a) over Zhang et al. '291. Applicants respectfully traverse this ground of rejection.

The claimed apparatus is able to crystallize a semiconductor placed in a chamber by irradiating laser light and forming a silicon oxide or a silicon nitride layer in the chamber at the same time. However, Zhang et al. fails to teach or to suggest an apparatus that accomplishes such a task. Furthermore, Zhang et al. fails to teach or to suggest the subject matter recited in claims 8, 55, 62 and 63 from which claims 67-70 depend, respectively. Accordingly, Applicants respectfully request that the §103(a) rejection of claims 67-70 be reconsidered and withdrawn.


Finally, filed contemporaneously herewith is an Information Disclosure Statement and Identification of Co-Pending Applications. Applicants respectfully request that the Examiner, in his next communication, acknowledge receipt and consideration of the instant IDS and that the Examiner employ the identification of co-pending applications as necessary.

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In view of the above, all of the claims in this case are believed to be in condition for allowance.
Should the Examiner deem that any further action by the Applicants would be desirable in placing
this application in even better condition for issue, he is requested to contact the undersigned.

Respectfully submitted,

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